THE RELATIVE VALUE OF HIGH AND OF LOW ALTITUDE IN THE TREATMENT OF TUBERCULOSIS.[1]

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While I recognize that our ideas are more or less influenced by our surroundings, and that men who practice at high altitudes are likely to favor it in treatment, while those practising at low altitudes are likely to think it best, yet we must divorce ourselves from such influence and discuss the question in an impartial manner, if we wish to arrive at the truth. The fact that one observer sees tuberculous patients do well at a high altitude does not prove that high altitude is the most advantageous place to treat tuberculosis; nor does the fact that another observer sees tuberculous patients do well at low elevations prove that such elevations are the best for tuberculous patients. These observations simply point to the fact that some tuberculous patients do well at high, and others at low, elevations; or, as it might be stated broadly, patients suffering from tuberculosis can get well at various altitudes. It remains, then, for us to discuss impartially, if such is possible, the conditions accompanying both high and low altitude, and then attempt to suit these conditions to the patient and his disease.

A few years ago it was thought that there was a specific climate for tuberculosis. Individuals suffering from the disease were led to believe that if they could only leave home and go to one of these favored places they could be cured. And they also felt that if they were to remain at home it was almost certain death. So strongly has this idea taken hold of the people that they are led to do many foolish things. They leave home without any idea of where they are going or what they are going to do when they arrive at their destination. The thing that they have uppermost in their minds is reaching this favorable clime. All else is secondary. But the time comes when the "favored climate" is secondary, and meeting the conditions of life and adapting themselves to the climatic change is primary. These difficulties and annoyances could be largely eliminated by carefully advising patients before they leave home.

The task of choosing a climate for an individual suffering from a disease is one of great importance, for unless it is properly suited it is capable of doing harm. The idea is prevalent that anyone can make a change of climate. So they can, but it is not everyone that can make an intelligent change. To prescribe climate requires as much skill as to prescribe drugs. In prescribing a climate for one suffering from tuberculosis the disease and the individual both must be kept in mind.

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[1] Read at the twenty-fourth annual meeting of the American Climatological Association, Washington, D. C., May 7, 8, and 9, 1907.

The principles underlying climatotherapy are not so difficult, if only one stops long enough to understand them. The beneficial effect of a change upon nutrition is well known, even if the change be one only of surroundings, and not of climatic conditions. The effect of going to a less favorable climate than that in which one lives is often beneficial. How much more beneficial, then, should a change be which is carefully suited to the patient and his disease.

The primary effect of climatic treatment is upon metabolism. Its fundamental effect is upon tissue change, and its effect depends upon its powers of abstracting heat. The heat abstracting power of a climate depends upon the temperature, humidity, and the movements of the air. A cold climate, then, with much wind, makes the greatest demands upon the system for heat; a warm, humid climate, with absence of wind, should make the least. A dry, warm climate cannot be equable, because it does not hold heat well, and as soon as the sunshine ceases, or as soon as the shade is entered, the air becomes cool. The wide diurnal variation in dry climates is due to this fact.

Thus it can be seen that a climate which makes great demands for tissue change requires a hardy man to endure it. It would be unwise to send one who has low vitality, and who endures cold badly, to such a climate with the expectation of his deriving benefit from the change, for his forces could be overtaxed in supplying the normal waste incident to such rigorous conditions. On the other hand, such a patient would doubtless improve in strength and weight very materially if surrounded by such climatic conditions as would allow of the body cells keeping up the natural tissue change and still having some power in reserve to apply to the building-up of a stronger constitution. Cold climates are stimulating, while warm, humid climates are enervating. Between these we have all grades, and so, if we form a correct opinion of our patient, we can find a suitable climate for him.

It must be remembered that climatic conditions change with the seasons. Thus the climate of the Rocky Mountain regions at an altitude of 5000 feet is cold and rigorous in the winter, but temperate in the summer. Many people who might not be able to endure the winter might profitably spend the summer months there.

One suited to life in a cold rigorous climate, or at high altitude, should belong to the hardier type of men, with good circulatory, digestive, and assimilative powers. The young and robust are particularly suited to such conditions, while those in advancing years should be spared the excessive demand for tissue change.

The first point, then, that should be considered in choosing a climate for a tuberculous patient is his ability to respond to the demand for tissue change, which will be made by such climatic change. This point must be determined upon regardless of the question as to the adaptability of high altitude to the treatment of tuberculosis.

For many years high altitude was considered to be an essential in the treatment of tuberculosis. This opinion was due largely to the statements of Dr. Archibald Smith, who wrote, in 1840, that in the Peruvian Andes immunity from tuberculosis was commonly observed at an elevation of 7500 to 8500 feet. This was very evident, because in the cities at lower altitudes and at the base of the mountains tuberculosis was rife. This same apparent immunity was noted in the Rocky Mountains and also in the Alps. The natural conclusion is that high altitude confers immunity. This was honestly believed for many years.

Other observations, however, were made, which cast some doubt upon the supposed immunity being due to the altitude per se. It was found that the Steppes of Tartary, some portions of which are below sea level, and the great desert of the Southwest in America, portions of which are also below sea level, likewise share this apparent immunity from tuberculosis. This forced the conclusion that it is not altitude per se, but certain conditions which exist in common between high altitudes and these great desert regions which causes this apparent immunity.

If we stop to inquire what these conditions are, we note that both have: (1) A sparse population; (2) a great amount of sunshine; and (3) a pure air with low bacterial content.

When we consider that these are the conditions which are favorable to the prevention of the spread of tuberculosis, we can readily explain why tuberculosis does not exist to any extent in such regions. Tuberculosis is a disease which is most rife where overcrowding exists. It is particularly a disease of cities, and especially prevalent among the poor. Sunlight is the greatest enemy of the bacilli and our most reliable prophylactic, consequently we would not expect tuberculosis to spread very rapidly in these sparsely populated districts.

The votaries of high altitudes have endeavored to explain its benefits as being due to things which are not in common with low altitudes, and they have almost invariably used the damp lowland climates in the comparison. Consequently, they claim that the value of high altitude is due to lowered atmospheric pressure, a greater diathermacy, an increased electric tension, dryness of the atmosphere, and a great amount of sunshine. Granting that these are the elements of value, they are all present, except the first, in the low altitudes possessing dryness of atmosphere; consequently, there must be some other reason assigned to their supposed superiority of high altitude or we must accept the conclusion that high altitude is not an essential to the treatment of tuberculosis.

Now let us examine the other side of the ledger and see if there are any reasons why high altitude is contra-indicated in the treatment of tuberculosis? In the first place, high altitude treatment is contrary to the principle of rest in inflammations in general and tuberculosis in particular. The accepted principle of treatment in tuberculosis is rest, and it is employed whenever possible, so it is well to stop and inquire whether or not we should make an exception in case of the lung, and, if so, why so?

That high altitude causes great activity on the part of the lungs and throws great strain on the heart which is already severely taxed is an accepted fact, and one which cannot be ignored in the discussion of this subject.

That rest is the better method of treatment of pulmonary tuberculosis is also suggested by the observation which I have made repeatedly with reference to that portion of the lung which immediately surrounds the heart. When this part becomes seriously affected, especially on the left side, where it receives the greatest impulse of the heart beat, it is very slow at healing. I believe that the proper explanation of this fact is associated with the constant motion of the part owing to the action of the heart.

Another point relative to the employment of high altitude is the condition of the patient. It seems unreasonable to place an individual who is deprived of a portion of his aërating surface under conditions where he is subjected to a natural demand for more respiratory effort, and one whose heart is undergoing an extra strain under circumstances where it will be subjected to more strain. It also seems unreasonable to place one who is suffering from the severe bodily drain incident to tuberculosis, whose vitality is lowered, whose bodily functions are interfered with, in such conditions as to be called upon for an exaggerated tissue change, such as is required to meet the demand which is made by a high altitude. This consideration calls in question the advisability of sending those who have advanced lesions to a high altitude, and suggests that if a high altitude is the best place for treating tuberculosis, only those who have slight lesions should be chosen for such treatment. Further consideration would also suggest another important limitation, that is, of early cases only those should be sent who are able to meet the extra demand made upon them by the climatic conditions found.

Another important point in the treatment of tuberculosis is the after-result. It has long been noted that patients who secure an arrestment of their trouble at high altitude must remain there afterward. It seems to me that the explanation of this might be suggested by another observation which is common to men who see many cases of tuberculosis, that is, that tuberculosis is common among athletes. It seems to me that the reason for this lies in the overstraining. Athletes are subjected to more or less constant strain. Their heart and lungs over-develop to meet the extra burden thrown upon them.

They become larger than is necessary to carry on the usual work associated with the ordinary duties of life. When they leave the athletic field and settle down to the usual routine of life, they are at a disadvantage. They have more lungs and heart than they need. Nature attempts an adjustment. A retrograde process supervenes, the organs become more or less flabby and less resistant. That this is probable we may infer from our observations on muscles which have been over-developed and those subjected to disease.

When one becomes adjusted to a high altitude the heart and lungs increase in size just as those of the athlete, and when he returns to the low altitude his heart and lungs must undergo a readjustment, a retrograde process must take place. In the case of tuberculosis it is probable that during this time the tissues are not so resistant as usual and that the patient is prone to have renewed activity in the old process.

From these observations I am led to the conclusion that tuberculosis is a disease which is best treated at low elevations.

THE RELATIONS BETWEEN DIABETES AND PREGNANCY:

WITH THE REPORT OF A CASE OF DIABETES IN WHICH THE GLYCOSURIA DISAPPEARED WITH THE INCEPTION OF PREGNANCY AND REAPPEARED AFTER DELIVERY.[1]

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Diabetes mellitus must be looked upon as the expression of a derangement of carbohydrate metabolism, resulting in the more or less constant presence of an excessive amount of sugar in the blood, and, secondarily, in the urine, together with profound nutritional disturbances. The transitory appearance of sugar in the urine is not rarely observed in conjunction with a number of other conditions, while occasionally in cases of diabetes the sugar disappears from the urine with the onset of acid intoxication and coma, and perhaps it may be absent also at other times.

Sugar has been observed so frequently in the urine of pregnant, parturient, and puerperal women that its presence has been designated physiological. H. Blot[2] found in the urine of all parturient and nursing women and in that of about half of all pregnant women

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[1] Read at a meeting of the Association of American Physicians, Washington, D. C., May 7, 8, and 9, 1907.

[2] Gaz. d. hôp. civiles et milit., 1856, p. 482.